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Southeastern Forest
Experiment Station

FOREST RESEARCH in the SOUTHEAST

August 1986

Recent Publications
of the
Southeastern Forest Experiment Station
Asheville, North Carolina

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Recent Publications of the Southeastern Forest Experiment Station

LOBLOLLY PINE MANAGEMENT GUIDES

Two more in a series of papers on the management of the most important timber species in the South are off the presses. They are on the related topics of nutrient cycling and fertilizer application. They represent the latest research findings, and they are written in a way that field foresters can understand.

Nutrient Cycling

Maintaining or improving the productivity of the land is part of the forestry ethic. It is one of the things that sets good land stewards apart from exploiters. In the long rotations of traditional forestry, this ethical dictum usually was satisfied by obtaining adequate reproduction after harvests. Trees did good things to the soil, and the infrequent harvests didn't seem to matter. An isolated instance of declining site productivity in a managed forest occurred over 100 years ago in Bavaria. For many years, farmers near the forest had gathered firewood from the forest floor. After careful analysis of the problem, firewood gathering was discontinued.

That kind of careful analysis and some form of corrective action may prove necessary for some southern pine sites. Short rotations and chipping of entire trees, including foliage, are taking away soil nutrients faster than they have ever been taken before in well-managed forests.

Some of these nutrients leave in the harvested products. Others are lost through prescribed burning and some forms of intensive site

preparation. The key question is whether the rate of nutrient removal exceeds the long-term replenishment rate of the site. If it does, corrective action is needed to prevent a long-term decline in site productivity.

To manage the situation, a forester must have some understanding of nutrient cycling--the movement of nutrients into, within, and out of forest ecosystems. The new guide, "Foresters' Primer in Nutrient Cycling," provides the sort of information a forest manager needs. It tells the concentrations of nitrogen, phosphorus, and potassium found in various tree parts as the trees age. It gives the quantities of nutrients that accumulate in the forest floor beneath loblolly pine and the quantities that break down and pass to mineral soil. It also estimates the nutrient losses associated with prescribed burning and other forms of site preparation.

Copies of this guide may be obtained by checking GTR-37 on the back cover.

Applying Fertilizer

Lots of articles have described dramatic improvements in the growth of loblolly pine achieved by applying fertilizers containing nitrogen, phosphorus, or both. What they haven't told you is whether you can achieve the same kinds of gains in your stands. As forest treatments go, fertilizer application is pretty expensive--too expensive to do without assurance of a positive result. Hence, use of fertilizers in loblolly pine plantations has been quite limited.

A new management guide, "When and Where to Apply Fertilizer," gives the kind of information a forest manager needs to decide about fertilizer application. Here are some of the key conclusions:

• nutrients. Special procedures must be followed in collecting foliage samples.

• poor site index at age 25 by 10 to 15 feet on typical very poorly, poorly, and somewhat poorly drained soils on the lower Coastal Plain.

• a need for soil phosphorus.

• increment can be increased by 200 to 300 cubic feet per acre per year by applying 150 pounds of nitrogen and 25 pounds of phosphorus per acre if both are needed.

• nitrogen supply is limiting, but moisture conditions are favorable. Highly responsive stands have basal areas of 70 to 120 square feet per acre, foliar nitrogen contents less than 1.2 percent, and site indexes at age 25 between 50 and 75 feet.

For details, check GTR-36 on back cover.

TRANSPIRATIONAL DRYING

A major drawback in commercial use of wood for energy is the high initial moisture content of the wood. As any woodstove or fireplace user knows, dry wood provides a lot more energy than damp wood. Unfortunately, seasoning in the atmosphere is a slow process, and heating the wood to speed the process makes little sense when heat is what the wood will be producing.

A scientist at the Southeastern Station has demonstrated an excellent low-cost method for getting the drying of green wood off to a fast start. It is called transpiration drying, and it is quite simple. You fell the tree during the growing season and leave the bole and top intact for a few weeks. Transpiration from the leaves continues, removing much of the free water from the stem.

In a study in Georgia, transpirational drying was more effective in sweetgum and yellow-poplar, which are quite wet to start

with, than in oak, which is relatively dry at the outset. Over the 8 weeks after felling, moisture content of wood and bark was reduced from 74 to 60 percent in red oaks, from 109 to 67 percent in sweetgum, and from 104 to 64 percent in yellow-poplar. Significantly, most of the drying was achieved in the first week after felling.

Copies of a Forest Products Journal reprint describing this study may be obtained by checking R-51 on the back cover.

ECONOMIC IMPACTS OF RECREATION AND TOURISM

In recent years, public funding for outdoor recreation facilities has declined. Many recreation managers believe that the cuts have been excessive because the economic benefits of tourism and recreation usually are underestimated. It is easy to determine employment and spending in businesses that specialize in service to recreators--motels and marinas, for example. It is much more difficult to know how much tourists spend in general service businesses like drugstores and supermarkets. Because estimation techniques are not widely known, the estimates often are not made.

To document available technology, the Southeastern Station asked leading economists in the field to describe their approaches at a conference and workshop at Michigan State University. We have a limited supply of the proceedings of the conference for people interested in this specialized form of economic analysis. Single copies may be obtained by checking R-62 on the back cover.

LIST OF RECENT PUBLICATIONS

R-37 Alig, Ralph J.
Econometric analysis of the factors influencing forest acreage trends in the Southeast. Forest Science 32(1): 119-134; 1986.

Econometric models of changes in land use acreages in the Southeast by physiographic region were developed by pooling cross-section and time series data. Of the variables examined, population and personal income measures were the major significant explanatory variables in the land use equations.

R-38 Anderson, R.L.; Walkinshaw, C.H.
Susceptibility of longleaf pine seedlings to Cronartium quercuum f. sp. fusiforme in greenhouse tests. Plant Disease 70(1):50-51; 1986.

Seedlings from families of 13 wind-pollinated longleaf, 2 loblolly, and 2 slash pines were inoculated with basidiospores of Cronartium quercuum f. sp. fusiforme. Incidence of infection in families of longleaf pine seedlings ranged from 16 to 38 percent, compared with 33 to 86 percent for families of slash and loblolly pines. Screening longleaf pine families by inoculation of seedlings with basidiospores appears feasible.

R-39 Anderson, Robert L.; Cost, Noel D.; McClure, Joe P. [and others].
Predicting severity of fusiform rust in young loblolly and slash pine stands in Florida, Georgia, and the Carolinas. Southern Journal of Applied Forestry 10(1):38-41; 1986.

The system described allows the manager to estimate the probability of having different amounts of rust infection in newly established stands. By selecting the geographic location of a stand, the species, and the type of regeneration, the manager can assess these probabilities.

R-40 Belanger, R.P.; Hedden, R.L.; Tainter, F.H.
Managing Piedmont forests to reduce losses from the littleleaf disease--southern pine beetle complex. Agric. Handb. 649. Washington, DC: U.S. Department of Agriculture; 1986. 19 pp.

The interaction between the disease and the insect is described and preventive cultural treatments are given.

N-338 Boyd, Roy
Forest taxation: Current issues and future research. Res. Note SE-338. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 14 pp.

The literature suggests that the property tax is biased against timber growing, and that a tax on site value alone is closest to the ideal of complete neutrality. Preliminary evidence also suggests that current capital-gains treatment of timber income may benefit capital owners much more than laborers.

R-41 Bridgwater, F.E.; Williams, C.G.; Campbell, R.G.
Patterns of leader elongation in loblolly pine families. Forest Science 31(4):933-944; 1985.

The strong correlation between variables that describe family leader elongation patterns and height performance over many sites suggests that understanding shoot morphology may improve juvenile genetic selection for mature performance.

RB-84 Brown, Mark J.
Forest statistics for the Northern Piedmont of Virginia, 1986. Resour. Bull. SE-84. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 52 pp.

In the Northern Piedmont of Virginia the area of timberland has decreased more than 6 percent to 2.4 million acres. More than 24,000 acres were harvested annually and retained in timberland. About 22,000 acres were regenerated annually either artificially or naturally. Net annual growth of growing stock declined 11 percent to 126 million cubic feet. Annual removals declined 23 percent since 1976. Mortality has increased 25 percent from the previous survey.

RB-85 Brown, Mark J.
Forest statistics for the Northern Mountains of Virginia, 1986. Resour. Bull. SE-85. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 56 pp.

Since 1977 the area of timberland in the Northern Mountains of Virginia has decreased almost 4 percent to 2.5 million acres. Net annual growth of growing stock has declined 7 percent and totaled 88 million cubic feet. Annual removals of growing stock decreased 29 percent

and totaled 23 million cubic feet. Annual mortality of growing stock totaled 26 million cubic feet, up 82 percent.

R-42 Clark, Alexander, III; Saucier, Joseph R.; McNab, W. Henry
Total-tree weight, stem weight, and volume tables for hardwood species in the Southeast. Ga. For. Res. Pap. 60. Macon, GA: Georgia Forestry Commission, Research Division; 1986. 45 pp.

Tables show weight and volume of the total tree and various stem portions for yellow-poplar, sweetgum, blackgum, white oak, red oak species, water and laurel oak, and hickory trees 1 to 20 inches d.b.h. growing in the Southeast.

N-339 Drooz, A.T.; Huber, C.M.; Ghent, J.H.
Nematodes attacking the larch sawfly, Pristiphora erichsonii, in North Carolina. Res. Note SE-339. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 3 pp.

This is the first record of nematodes attacking the larch sawfly, Pristiphora erichsonii (Hartig), under natural field conditions.

N-340 Drooz, A.T.; Smith, T.F.; Doggett, C.A.
Outbreak of a rare Lymantriid, Orgyia detrita in coastal North Carolina. Res. Note SE-340. Asheville, NC: U.S. Department of Agriculture, Forest Service; Southeastern Forest Experiment Station; 1986. 3 pp.

A defoliator of live oak and other trees and shrubs was detected in a coastal area of North Carolina in 1981. It

proved to be a rarely observed tussock moth, O. detrita. Preliminary studies indicate that it is univoltine, has five instars, and takes about 6 weeks from hatch to moth stage.

N-337 Edwards, M. Boyd
Three-year performance of planted loblolly pine seedlings on a lower Piedmont site after six site-preparation treatments. Res. Note SE-337. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 3 pp.

Three years after the most intensive of six site-preparation treatments--shearing, burning, disking, fertilizing, and herbicide application--seedlings were 1.5 feet taller when compared with the control and had 8 percent better survival.

R-43 Fatzinger, Carl W.
Attraction of the black turpentine beetle (Coleoptera: Scolytidae) and other forest Coleoptera to turpentine-baited traps. Environmental Entomology 14(6):768-775; 1985.

Traps baited with gum turpentine of southern pines and deployed in north Florida from 1980-1983 captured numerous adults of the black turpentine beetle, Dendroctonus terebrans (Olivier); pales weevil, Hylobius pales (Herbst); pitch-eating weevil, Pachylobius picivorus (Germar); Carolina pine sawyer, Monochamus carolinensis (Olivier); southern pine sawyer, M. titillator (F.); and southern pine engraver beetles, Ips spp.

R-44 Gaby, Louis I.
The southern pines: Loblolly pine (Pinus taeda L.); longleaf pine (Pinus palustris Mill.); shortleaf pine (Pinus echinata Mill.); slash pine (Pinus elliottii Engelm.). American Woods Leaflet 256. Washington, DC: U.S. Department of Agriculture, Forest Service; 1985. 11 pp.

Provides distribution (with map), description, growth, and various other characteristics, including principal uses.

R-45 Goyer, R.A.; Lenhard, G.J.; Nebeker, T.E. [and others].
Distinguishing immatures of insect associates of southern pine bark beetles. Agric. Handb. 641. Washington, DC: U.S. Department of Agriculture, Forest Service; 1985. 19 pp.

A guide illustrating the diagnostic characters of common immature insect associates of the southern pine beetle. Includes photos, drawings, and scanning electron micrographs.

R-46 Harris, Robert A.; Phillips, Douglas R.
Density of selected wood fuels. Ga. For. Res. Pap. 61. Macon, GA: Georgia Forestry Commission, Research Division; 1986. 6 pp.

Seven types of wood fuel were measured, in an industrial setting, to determine the density and moisture content of each type of fuel.

GTR-34 Hertel, Gerard D.; Branham, Susan J.; Swain, Kenneth M., Sr., eds.

Technology transfer in integrated forest pest management in the South. Gen. Tech. Rep. SE-34. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1985. 82 pp.

A synopsis of the technology transfer activities of the Forest Service's Integrated Pest Management Research, Development and Applications Program for Bark Beetles of Southern Pines, and the Southern Region, 1980-85, with emphasis on State demonstration projects and user involvement.

GTR-37 Jorgensen, Jacques R.; Wells, Carol G. **A loblolly pine management guide: Foresters' primer in nutrient cycling.** Gen. Tech. Rep. SE-37. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 42 pp.

The nutrient cycle, which includes the input of nutrients to the site, their losses, and their movement from one soil or vegetation component to another, can be modified by site preparation, rotation length, harvest system, fertilization, and fire, and by using soil-improving plants.

R-47 Kuhlman, E.G. **Impact of annosus root rot minimal 22 years after planting pines on root rot infested sites.** Southern Journal of Applied Forestry 10(2):96-98; 1986.

Mortality due to annosus root rot among trees of seven species on two sites was 6 percent or less by age 10. Previous stands on these sites had been clearcut

because the disease was widespread. After 22 years neither basidiocarps of Heterobasidion annosum nor trees with symptoms of annosus root rot were present in the plantations.

R-48 McAlister, Robert H.
Performance of truss plate joints in structural flakeboard and southern pine dimension lumber. Forest Products Journal 36(3):41-43; 1986.

In tension tests of two types of metal truss connectors installed in structural flakeboards, the 2 by 4 and 2 by 6 plates showed higher ultimate loads in the flakeboards than the 3 by 4 and 3 by 3 plates. Plates with longer teeth had higher load values than plates with short teeth.

R-49 McAlister, Robert H.
Species and core joint design affect tensile strength and stiffness of composite truss lumber. Forest Products Journal 36(2):55-58; 1986.

In tests of composite truss lumber 2 by 4's made with southern pine veneer and sweetgum veneer, allowable tensile stress of the composite was generally equivalent to the allowable tensile stress for southern pine No. 1 kiln-dried dimension lumber (1,050 lb/in^2). Sweetgum veneer was superior to southern pine veneer, and scarf joints were superior to butt joints.

R-50 McKee, W.H., Jr.; Wilhite, L.P.
Loblolly pine response to bedding and fertilization varies by drainage class on lower Atlantic Coastal Plain sites. Southern Journal of Applied Forestry 10(1):16-21; 1986.

Growth response of loblolly pine (Pinus taeda L.) to bedding and phosphorus fertilization was determined on three sites classified as moderately well, somewhat poorly, and poorly drained. Ten-year height and diameter growth showed a pronounced response to treatments on the poorly drained site. Bedding and fertilization interacted only on the poorly drained site, where response to bedding was most pronounced.

N-341 McMinn, James W.
Derivation of prism factors for quantifying tree crown competition. Res. Note SE-341. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 4 pp.

A prism factor of 10 appears to be reasonable for quantifying crown competition around individual loblolly pine trees.

R-51 McMinn, James W.
Transpirational drying of red oaks, sweetgum, and yellow-poplar in the Upper Piedmont of Georgia. Forest Products Journal 36(3):25-27; 1986.

Red oaks, sweetgum, and yellow-poplar were felled in late July and allowed to lie at the stump for up to 8 weeks with the entire bole and crown intact. Moisture content of wood and bark was reduced from 74 to 60 percent in red oaks, 109 to 67 percent in sweetgum, and 104 to 64 percent in yellow-poplar. Most of the drying was achieved within 1 week of felling.

GTR-38 McMinn, James W.
Wood energy potential in northwestern South Carolina. Gen. Tech. Rep. SE-38. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 8 pp.

The quantity of unused wood in an 18-county area in northwestern South Carolina was projected to be more than 16 million tons annually. Wood unsuitable for products other than fuel is nearly 9 million tons annually. The most likely energy demand by industrial plants for wood fuel systems is 1.5 million tons annually; maximum projected demand is 3 million tons per year.

R-52 McMinn, James W.; Stubbs, Jack
In-woods drying of eucalypts in southern Florida. Forest Products Journal 35(11/12):65-67; 1985.

Trees were felled in November and sampled for initial moisture content, cut into 8-foot bolts and allowed to dry 4 weeks, or left lying with stems and crowns intact to dry via natural transpiration mechanisms for 4 weeks. A 4-week drying period at the stump reduced moisture content to 114 and 94 percent in stacked bolts and to 78 and 63 percent in transpirationally dried trees. The moisture reductions would produce energy gains per unit weight of fuel of 15 to 24 percent for stacked bolts and approximately 50 percent for intact trees.

R-53 Matthews, Fred R.; Bramlett, David L.
Pollen quantity and viability affect seed yields from controlled

pollinations of loblolly pine. Southern Journal of Applied Forestry 10(2):78-80; 1986.

Artificial pollination tests show that, to compensate for low viability of pollen lots, pine breeders should increase the number of flowers pollinated rather than the quantity of pollen per bag.

R-54 Meyer, Wendy L.; DeBarr, Gary L.; Hanula, James L. [and others]. **Z-11-hexadecenyl acetate, a sex pheromone component for the southern pine coneworm, Dioryctria amatella (Lepidoptera: Pyralidae).** Environmental Entomology 15:316-320; 1986.

A sex pheromone component for the southern pine coneworm moth, Dioryctria amatella (Hulst), was identified as Z-11-hexadecenyl acetate (Z11-16:OAc) and was attractive to male moths in loblolly pine, Pinus taeda L., seed orchards.

R-55 Neary, D.G.; Swift, L.W., Jr.; Manning, D.M. [and others]. **Debris avalanching in the Southern Appalachians: An influence on forest soil formation.** Soil Science Society of America Journal 50(2):465-471; 1986.

Results of a debris avalanche after heavy rain are described. Although debris avalanching in the Appalachian Mountains is a rare phenomenon in human history (100-1000+ yr return period), it is a major and frequent geomorphic process influencing soil formation.

R-56 Nebeker, T. Evan; Hodges, John D.; Karr, Bob K. [and others].
Thinning practices in southern pines--with pest management recommendations. Tech. Bull. 1703. Washington, DC: U.S. Department of Agriculture, Forest Service; 1985. 36 pp.

This treatise presents the concept of thinning, reviews and summarizes thinning research, and surveys current field practices. The positive and negative aspects of these practices on current or potential problems are discussed. Management approaches are suggested that will help minimize losses.

R-57 Patterson, E.M.; McMahon, C.K.; Ward, D.E.
Absorption properties and graphitic carbon emission factors of forest fire aerosols. Geophysical Research Letters 13(1):129-132; 1986.

Data on the optical absorption properties (expressed as a specific absorption, B_a) of the smoke emissions from fires with forest fuels are reported for a series of low-intensity field fires and a series of laboratory fires.

R-58 Powers, H.R., Jr.
Performance of Livingston Parish loblolly in the Georgia Piedmont. Southern Journal of Applied Forestry 10(2):84-87; 1986.

The rust resistance of Livingston Parish loblolly pines was outstanding on the Georgia Piedmont; 83 percent were free of disease, compared with only 14 percent of the commercial controls. There

was no difference in growth between the two groups of trees, and ice breakage was not significantly greater in the Livingston Parish trees.

R-59 Powers, H.R., Jr.
Rusts of pines in North America. In: Ko, Je-Ho; La, Yong-Joon, eds. Proceedings, joint conference of IUFRO working parties on forest gall midges and rusts of pines, working parties S2.07-08 & S2.06-10; 1985 September 16-21; Seoul, Korea. Suweon, Korea: The Korean Forestry Society; 1985:1-12. [Available from Southeastern Forest Experiment Station, Forestry Sciences Laboratory, Athens, GA]

A brief description of pine rusts caused by Cronartium, Endocronartium, Coleosporium, and Melamspora spp.

R-60 Powers, H.R., Jr.
Selecting and breeding pines resistant to fusiform rust. In: Ko, Je-Ho; La, Yong-Joon, eds. Proceedings, joint conference of IUFRO working parites on forest gall midges and rusts of pines, working parties S2.07-08 & S2.06-10; 1985 September 16-21; Seoul, Korea. Suweon, Korea: The Korean Forestry Society; 1985:115-128. [Available from Southeastern Forest Experiment Station, Forestry Sciences Laboratory, Athens, GA]

A brief description of the location and breeding of southern pines for resistance to fusiform rust.

R-61 Powers, H.R., Jr.; Stone, D.M.
Incidence of fusiform rust infection on loblolly pine related to tip moth

damage. In: Ko, Je-Ho; La, Yong-Joon, eds. Proceedings, joint conference of IUFRO working parties on forest gall midges and rusts of pines, working parties S2.07-08 & S2.06-10; 1985 September 16-21; Seoul, Korea. Suweon, Korea: The Korean Forestry Society; 1985:129-134. [Available from Southeastern Forest Experiment Station, Forestry Sciences Laboratory, Athens, GA]

Treatment of seedlings with carbofuran to control tip moths in some way decreased their susceptibility to fusiform rust.

R-62 Propst, Dennis B., compiler. **Assessing the economic impacts of recreation and tourism.** Conference and workshop; 1984 May 14-16; East Lansing, MI. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1985. 64 pp.

The papers contained in this conference proceedings: (1) explore and assess the best available technology for measuring secondary impacts of recreation and tourism, and (2) recommend research strategies for meeting methodological and data needs.

R-63 Rowan, S.J. **Triadimefon controls fusiform rust in young slash pine plantations.** Southern Journal of Applied Forestry 10(2): 112-114; 1986.

Triadimefon (Bayleton®) effectively controlled fusiform rust in a slash pine (Pinus elliottii Engelm. var. elliottii)

plantation when three or more foliar sprays containing 600 p/m a.i. were applied annually in March through June.

R-64 Rowan, S.J.; Kelley, W.D. **Survival and growth of outplanted pine seedlings after mycorrhizae were inhibited by use of triadimefon in the nursery.** Southern Journal of Applied Forestry 10(1):21-23; 1986.

Triadimefon (Bayleton®), applied as foliar sprays at recommended and higher rates to pine seedlings in nursery beds, inhibited development of mycorrhizal roots, but subsequent survival percentages and rates of growth of the seedlings in plantations were not affected.

R-65 Schroeder, James G.; Taras, Michael A. **Atlantic white-cedar (Chamaecyparis thyoides (L.) B.S.P.).** American Woods Leaflet 225. Washington, DC: U.S. Department of Agriculture, Forest Service; 1985 rev. 5 pp.

Provides distribution (with map), description, growth, and various other characteristics, including principal uses.

N-342 Sluder, Earl R.; Powers, Harry R., Jr. **Further comparisons between infection of loblolly and slash pines by fusiform rust after artificial inoculation or planting.** Res. Note SE-342. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 3 pp.

Seedlings from half-diallel crosses, one each of loblolly and slash pines, were used to test the effectiveness of artificial inoculation for predicting field

infection by fusiform rust. The correlation between artificial inoculation disease ratios and 5-year field infection percentages was not significant for loblolly pine (r=0.32) but was significant for slash pine (r=0.83). Variation in percentage galled among progenies in the field was not as great for loblolly pine (62 to 98) as it was for slash pine (18 to 100).

R-66 Swift, L.W., Jr.; Cunningham, G.B. **Routines for collecting and summarizing hydrometeorological data at Coweeta Hydrologic Laboratory.** In: Michener, William K., ed. Research data management in the ecological sciences: papers from a symposium; 1984 November 4-6; Georgetown, SC. Columbia, SC: University of South Carolina Press; 1986:301-320.

A review of the concepts and procedures developed to collect, edit, and summarize hydrometeorological data at Coweeta and intended as a reference for users of these data.

R-67 Swift, Lloyd W., Jr. **Filter strip widths for forest roads in the Southern Appalachians.** Southern Journal of Applied Forestry 10(1): 27-34; 1986.

Filter strip standards currently applied to forest roads in the Southern Appalachian Mountains may specify greater widths than are necessary with prevailing construction practices. Discussion of management considerations leads to proposed revised guidelines for minimum filter strip widths for the southern mountains.

P-254 Vick, Charles B.
Lamination of composite framing with melamine-formaldehyde adhesive and radio-frequency curing. Res. Pap. SE-254. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1986. 9 pp.

A melamine-formaldehyde adhesive was tested for its ability to bond yellow-poplar and sweetgum veneer laminates to highly porous edges of mixed hardwood flakeboard cores (of the same species) in composite framing. The excellence of bonds was indicated by complete absence of delamination after severe cyclic accelerated aging tests and by essentially 100-percent wood failure in every sheared joint. These results were possible at exceptionally low rates of single-surface adhesive spreading.

R-68 Vick, Charles B.
Yellow-poplar (Liriodendron tulipifera L.). American Woods Leaflet 272. Washington, DC: U.S. Department of Agriculture, Forest Service; 1985. 7 pp.

Provides distribution (with map), description, growth, and various other characteristics, including principal uses.

GTR-36 Wells, Carol; Allen, Lee
A loblolly pine management guide: when and where to apply fertilizer. Gen. Tech. Rep. SE-36. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 1985. 23 pp.

Growth rates in loblolly pine (*Pinus taeda* L.) stands can often be increased markedly by applying phosphorus, nitrogen, or nitrogen and phosphorus fertilizers.

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